Alaska Department of Fish and Game
Division of Wildlife Conservation
July 1998

Brown Bears of Unit 4
Past, Present and Future:
A Status Report and Issues Paper

STATE OF ALASKA
Tony Knowles, Governor

DEPARTMENT OF FISH AND GAME
Frank Rue, Commissioner

DIVISION OF WILDLIFE CONSERVATION
Wayne L. Regelin, Director

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STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

DIVISION OF WILDLIFE CONSERVATION

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July 21, 1998

Dear Interested Party:

Admiralty, Baranof, and Chichagof Islands are home to one of the highest concentrations of brown bears in the world. Roughly 4,200 bears are believed to occupy this area, averaging about one bear per square mile. These bears are highly valued by hunters, wildlife watchers, guides, tourism operators, and the general public.

The long-term conservation of these animals will require careful management as industrial and recreational pressures on wildlife populations increase. The Division of Wildlife Conservation does not believe there is any imminent problem regarding the population of brown bears across Unit 4. Yet, over the past few years we have been receiving more and more comments on a variety of topics such as viewing, harvest level, the increase in the number of big game guides, crowding in specific areas, and long-term effects of land management practices on brown bears. I felt it was time to summarize our current state of knowledge and provide this information in a convenient format to the public. It is my hope you and other members of the public might suggest some approaches ADF&G and other government agencies and the public can take to jointly solve some of the current concerns

Comments can be sent to:

Kim Titus, Regional Supervisor
Alaska Department of Fish & Game
Division of Wildlife Conservation
PO Box 240020
Douglas, AK 99824

Please note that the Alaska Board of Game will be meeting in Ketchikan this fall from October 23-28. Proposed changes to brown bear regulations will be considered at this time. The deadline for submitting proposals to the board is August 7th. For more information, contact:

Alaska Board of Game
PO Box 25526
Juneau, AK. 99802-5526.
907-465-2027

Division staff in our offices in Douglas, Ketchikan, Petersburg, or Sitka can assist you if you desire more information about submitting a proposal to the board.

Thank you for your interest in brown bear management. I hope you will take the time to share your comments, concerns, and suggestions with us.

Sincerely,

Wayne L. Regelin

Wayne L. Regelin
Director

Brown Bears of Unit 4

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ACKNOWLEDGMENTS

This report represents the efforts of many individuals on the staff of the Southeast Region, Division of Wildlife Conservation, Alaska Department of Fish and Game.

Tom Paul was the principal writer and coordinator of the project. Jim Faro, Kimberly Titus, LaVern Beier, Bruce Dinneford, Anne Post, and Jackson Whitman contributed to the text. Tom Straugh, Grey Pendleton, Linda Bergdoll-Schmidt, and Rod Flynn provided technical support and expertise for production. Regional Supervisor Kimberly Titus and Regional Management Coordinator Bruce Dinneford supervised the project. Former Assistant Director of the Division of Wildlife Conservation Chris Smith and Region III planner Margo Matthews provided early guidance and useful suggestions. Becky Strauch of Division of Wildlife Conservation Information Management Section also provided technical support.

As a summary of the accumulated knowledge of brown bears in Unit 4 this report is also the product of former biologists, researchers, and brown bear managers in Unit 4; among them ADF&G wildlife biologists Loyal Johnson, Charlie Land, Tom McCarthy, John Schoen, Marilyn Sigman, Bob Wood, and Butch Young.

We acknowledge the continued support of the Federal Aid in Wildlife Restoration Program as the principal funding source for many of the ADF&G brown bear management and research activities upon which this report is based. The Greens Creek Mining Company provided financial assistance for the brown bear research project during the initial phases of their activities on Admiralty Island. The financial and logistic support of the USDA Forest Service during the early 1990's was instrumental in initiating cooperative studies on Northeast Chichagof Island.

INTRODUCTION

Our objectives for this paper are threefold: 1) describe the status of bear populations and the basis for current Alaska Department of Fish & Game (ADF&G) management for brown bears in Game Management Unit 4 (Unit 4) in Southeast Alaska; 2) provide a comprehensive summary of ADF&G's accumulated knowledge of Unit 4 brown bears that would be a useful reference for current and future resource managers, planners, and the public; 3) describe the problems we see looming for human and brown bear coexistence in Unit 4, and suggest some approaches that ADF&G, other government agencies, and interested members of the public can take jointly to solve these problems.

This paper begins with sections on the natural history, biology, and research on which our knowledge and management of Unit 4 bears is based. Sections on land management, viewing, and hunting cover the major issues we see affecting brown bears. They include background information, summaries of current management and status, and discussions of potential problems needing resolution.

The Unit 4 islands are home to one of the highest concentrations of brown bears in the world. The population density averages about one bear per square mile. They are the only island group in Southeast Alaska with persistent populations of brown bears. The estimated total population of Unit 4 is about 4,200 bears. ADF&G biologists believe the populations for all islands are at or near carrying capacity predicted by habitat models and are now stable.

As one of the few remaining and thriving brown bear populations in North America, the bears of Unit 4 are clearly one of the most charismatic and valuable wildlife species in Southeast Alaska. Hunters and wildlife viewers from many parts of the world have long been drawn to them and interest continues to grow. How we manage for brown bears long ago transcended the sphere of local and state influences to become a national issue.

Although brown bears currently appear overall to be doing well in Unit 4, the same human-caused pressures that led to their disappearance elsewhere are rising in Southeast Alaska. Increases in habitat loss, road construction, tourism, and other development pressures, continued community garbage control problems, and unresolved management issues between types of hunters and between hunters and nonhunters, all threaten the well-being of Unit 4 brown bears to varying degrees.

We recognize that many wildlife management issues are too complex to be dealt with by one agency alone. No one agency or interest group has the authority or expertise to mandate management solutions. And solutions imposed without broad public support are not likely to succeed. When deep-seated, persistent differences prevent humans from agreeing on wise solutions to management problems, wildlife populations usually suffer. We hope that this paper will provide a solid foundation for a broad-based public effort to deal with Unit 4 management issues before they cause problems in brown bear populations.

Chichagof Island *Tom Paul*

UNIT 4 PHYSIOGRAPHIC FEATURES AND HABITAT DESCRIPTION

Game Management Unit 4 is located in the northern portion of the Alexander Archipelago in Southeast Alaska (Fig. 1). Admiralty, Baranof, and Chichagof, often referred to as the ABC islands, are dominant features. Admiralty and Baranof each have an area of approximately 1,600 square miles. Chichagof is approximately 2,100 square miles. Two other large islands are part of Unit 4: Kruzof (172 sq mi) off the west coast of Baranof Island, and Yakobi Island (72 sq mi) at the northwest corner of Chichagof. Like elsewhere in the archipelago, a myriad of small islands dots the coastlines and bays of the larger islands.

The major islands of Unit 4 are characterized by rugged topography, with peaks rising to 3,000–4,000 ft within one mile of saltwater. The shoreline is irregular with many small islands and long, narrow, fjord-like bays. The soils are shallow and their moisture content dictates the plant communities present. Prior to logging, most of the drier sites were originally characterized by old growth Sitka Spruce (Picea sitkensis) and Western Hemlock (Tsuga heterophylla) forests with poorly drained areas at lower elevations characterized by muskegs. Several species of brush and berries (Menziesia, Rubus, and Vaccinium) occur in open and drier areas and within the better drained understory of old growth forests. Over 75,000 acres of National Forest have been logged and are now in various stages of regrowth. Numerous anadromous fish streams are present and utilized by five species of salmon (Oncorhynchus spp.), cutthroat and rainbow/steelhead trout (Oncorhynchus clarki and O. mykiss), and Dolly Varden char (Salvelinus malma). Bays often have deltas with grass/sedge plant communities at their heads or where streams enter saltwater. Higher elevations support muskeg, subalpine, and alpine plant communities.

A cool, maritime climate is characteristic of the unit. Snow often accumulates at sea level during winter, and elevations above 2,000 ft are covered by snow for 7–9 months of the year. Annual precipitation averages about 55 inches, and January and July temperatures average 20^0 F. and 55^0 F. respectively.

Except around communities and in areas that have been logged, most of Unit 4 remains unaltered from its natural state. In addition to the 75,000 acres of National Forest that have been logged, thousands of acres of private lands have also been clearcut. Six hundred forty miles of logging roads have been constructed on National Forest lands as well as a considerable number of miles on private lands. Commercial logging has been the most important human activity in altering brown bear habitat in the unit.

Mammals inhabiting Unit 4 include brown bear, Sitka black-tailed deer, mountain goat, marten, river otter, beaver, mink, muskrat, ermine, red squirrel, dusky and masked shrew, Keen's, long-legged and little brown bat, Keen's mouse, and long-tailed, meadow, and tundra vole. Some of these populations are indigenous and some (red squirrel, mountain goat, marten, and beaver) are the result of transplants (MacDonald and Cook 1996).

Permanent human communities include Angoon on Admiralty Island, Sitka and Port Alexander on Baranof Island, and Hoonah, Tenakee Springs, Pelican, and Elfin Cove on Chichagof Island. In addition people reside for at least part of the year in logging camps, resorts, fish hatcheries, fisheries research stations, small private allotments, and other settlements at scattered locations on the islands.

Origins and genetics of Unit 4 brown bears

Recent studies of brown bear mitochondrial and nuclear microsatellite DNA have revealed information about the species' classification and the genetic uniqueness of Unit 4 bears that may have implications for brown bear management and future bear research in Unit 4 and other areas of Southeast Alaska. The new genetic information has also given rise to a new hypothesis about the origin of Unit 4 brown bears.

Two theories have been proposed for the origin of brown bears in Unit 4. Klein (1965) suggested brown bears and other Southeast Alaska fauna colonized the region's islands approximately 10,000 years ago after the most recent ice age.

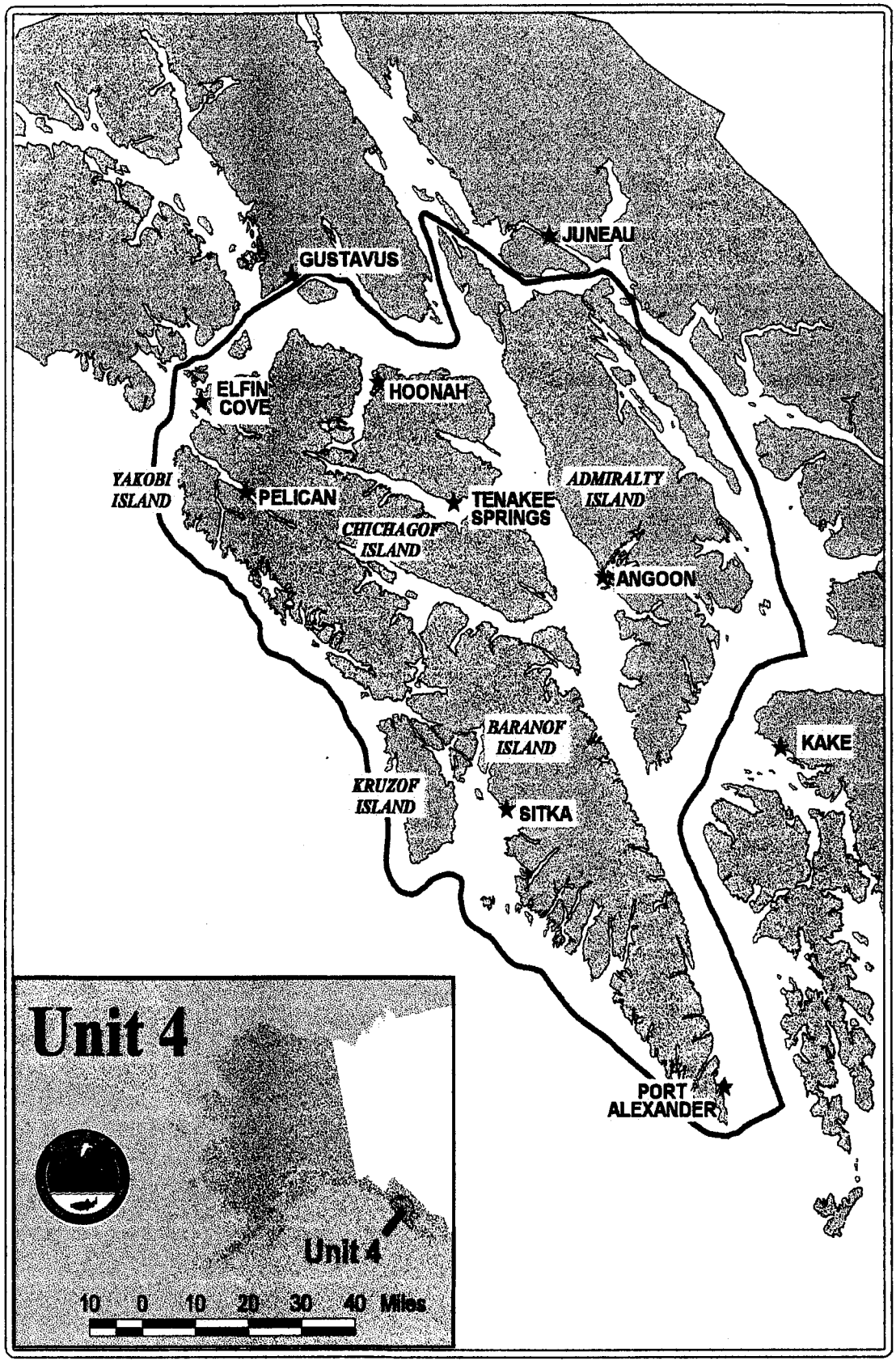

JUNEAU
GUSTAVUS
ELFIN COVE
HOONAH
YAKOBI ISLAND
PELICAN
TENAKEE SPRINGS
ADMIRALTY ISLAND
CHICHAGOF ISLAND
ANGOON
BARANOF ISLAND
KAKE
KRUZOF ISLAND
SITKA
PORT ALEXANDER
Unit 4
Unit 4
10 0 10 20 30 40 Miles

Figure 1

During that period (the Wisconsin glaciation) virtually all of the region was covered with ice. Klein's conclusion also presupposed that Unit 4 brown bears are closely related to mainland brown bears.

Heaton et al. (1996) pointed out that Klein's conclusions did not satisfactorily explain why brown bears are not found on other islands in the Alexander Archipelago. Using recent paleontological and genetic evidence, they propose a different origin for Unit 4 bears. They have suggested that brown bears were widespread in the region both before and after the Wisconsin glaciation and that brown bears on Admiralty, Baranof, and Chichagof (the ABC) islands are remnants of a pre-glacial population that survived on the islands through the ice age in unglaciated refugia. Heaton et al. cite new discoveries of brown bear fossils in caves on Prince of Wales Island to support their theory that brown bears were historically more widespread in Southeast Alaska. They cite new DNA evidence that suggests that brown bears on the ABC islands are very different genetically from those on the mainland and argue that, because of this genetic difference, ABC bears are not descendants from post-ice age mainland colonizers. Instead, they must have existed on the islands for a long time, isolated from other more recently arrived new world brown bears and evolving differently from them.

The genetic evidence cited by Heaton et al. is from mitochondrial DNA (mtDNA) studies by Talbot and Shields (1996a and 1996b). Brown bears from Admiralty, Baranof, and Chichagof islands were found to be unique from all other brown bears in the world and more closely related genetically to polar bears than to other brown bears. Mitochondrial DNA, which carries information about bears' maternity, tells us about historical events in a species' development, but not, except in very rare circumstances, about current gene flow. In the case of bears from the ABC islands, their very homogeneous mtDNA sequences suggests that on the female side they are genetically distinct from other North American brown bears, and that they are a relic of an invasion of U. arctos from Asia into Alaska prior to the glaciation, near the time polar bears branched off from a coastal form of brown bear.

The genetic separation of ABC brown bears from the other mtDNA lineages of brown bears goes back approximately 550,000 – 700,000 years. Being more closely related to polar bears does not mean ABC bears are more polar bear than brown bear. It means that other brown bears have changed more genetically from a common ancestor than ABC bears or polar bears have. Because both ABC bears and polar bears have been separated from the mainland brown bear gene pool for so long, they have more genes in common with each other than with interior and Asian bears. ABC bears' genetic antiquity, mtDNA homogeneity, and close relationship to polar bears makes them unique and "profoundly different" from other brown bears in the world (Shields, 1998 pers. comm.)

The genetic uniqueness found by Talbot and Shields was tempered somewhat and put in greater perspective by results of a subsequent study of bears' nuclear DNA. The study of nuclear microsatellites (Paetkau, Shields, and Strobeck 1998) complements the mtDNA study. Microsatellite DNA, unlike mtDNA, contains information on paternity and can be used to examine gene flow between populations. The study found that within the population of ABC bears, those of Baranof and Chichagof islands are so genetically close that the researchers combined them into a single genetic group.

Data from Paetkau et al. (1998) also indicate that although ABC brown bears have an ancient maternal history, they have not been isolated genetically in recent times. The microsatellite data tell us that male bears have been the agents of gene flow between Baranof/Chichagof islands and Kluane National Park in Yukon Territory to the north. To a lesser extent, some gene flow has also occurred between Admiralty bears and those on the mainland coast directly to the east. In contrast, there is little evidence of recent genetic interchange between Baranof/Chichagof bears and Admiralty bears across Chatham Strait.

The data show that genetic interchange between ABC and mainland bears has occurred within the past 25,000 years, but the data are limited in their ability to describe when or how it occurs (Shields, 1998 pers. comm.). For instance, is the gene flow only from mainland bears migrating to the ABC islands, only from island bears migrating to the mainland, or does it move in both directions? How frequently do bears make the crossing between the islands and the mainland? Since radio-telemetry studies began in the early to mid-1980s no radio collared bear has crossed to the mainland.

Paetkau et al. note that coastal bears in Southeast Alaska are not in genetic "equilibrium"; they are not freely breeding with one another. There are distinct genetic differences between bears in the north and those in the south portions of the region.

ADF&G biologists believe it is important that genetic studies of brown bears continue. A larger sample is needed from mainland brown bears in Southeast Alaska to further define the genetics of coastal bears in relation to bears of Unit 4. For instance, bears in Glacier Bay National Park have not been compared to bears from other mainland locations. Information on the genetics of Glacier Bay bears may be useful in explaining gene flow between Kluane National Park and the ABC islands.

All Unit 4 bear populations are thought to be stable and near carrying capacity, and the viability of populations is not currently in question. In view of the apparent genetic uniqueness of Unit 4 bears, long-term bear and habitat management must insure the continued viability of each major island population.

UNIT 4 BROWN BEAR BIOLOGY AND RESEARCH HISTORY

INTRODUCTION

Aside from C.H. Merriam's classification studies on Southeast Alaska brown bear taxonomy, since discredited, brown bear research prior to statehood was minimal. Dufresne and Williams conducted track count surveys in stream drainages on Admiralty Island in 1932 to estimate brown bear numbers. Similar U.S. Forest Service surveys were done on Chichagof Island in 1938 and Baranof Island in 1939.

Since statehood brown bear research in Southeast Alaska and Unit 4 has been conducted in response to development issues. There are two reasons for this: 1) impending development projects or perceived effects of development focus attention on the risks to bears; 2) funding becomes more available for development issues either because developers themselves provide the research funds or because agencies are able to make a stronger case for increased funding from overall agency budgets or legislatures when wildlife populations may be affected.

This section summarizes what we have learned about brown bear biology through ADF&G research in Unit 4 and what we believe are its key management implications.

HOOD BAY STUDY

During the summers of 1972 through 1975, Bob Wood of the ADF&G trapped, visually marked, and observed 35 brown bears at Hood Bay on Admiralty Island (Fig. 2). The purpose of the study was to get a population estimate and determine the extent of bear movements prior to anticipated logging of the area. Subsequently, the large long-term timber sale contract for Admiralty Island was cancelled. Using tagged:untagged ratios, Wood estimated the study area populations for 1993, 1994, and 1995 were 104, 70, and 72 bears respectively. Although conducted without the benefits of radio-telemetry, another conclusion of the study was that southern Admiralty Island bears have restricted home ranges. Maximum movement recorded was 7 miles and average movement between recorded points was 3.1 miles (Wood 1976).

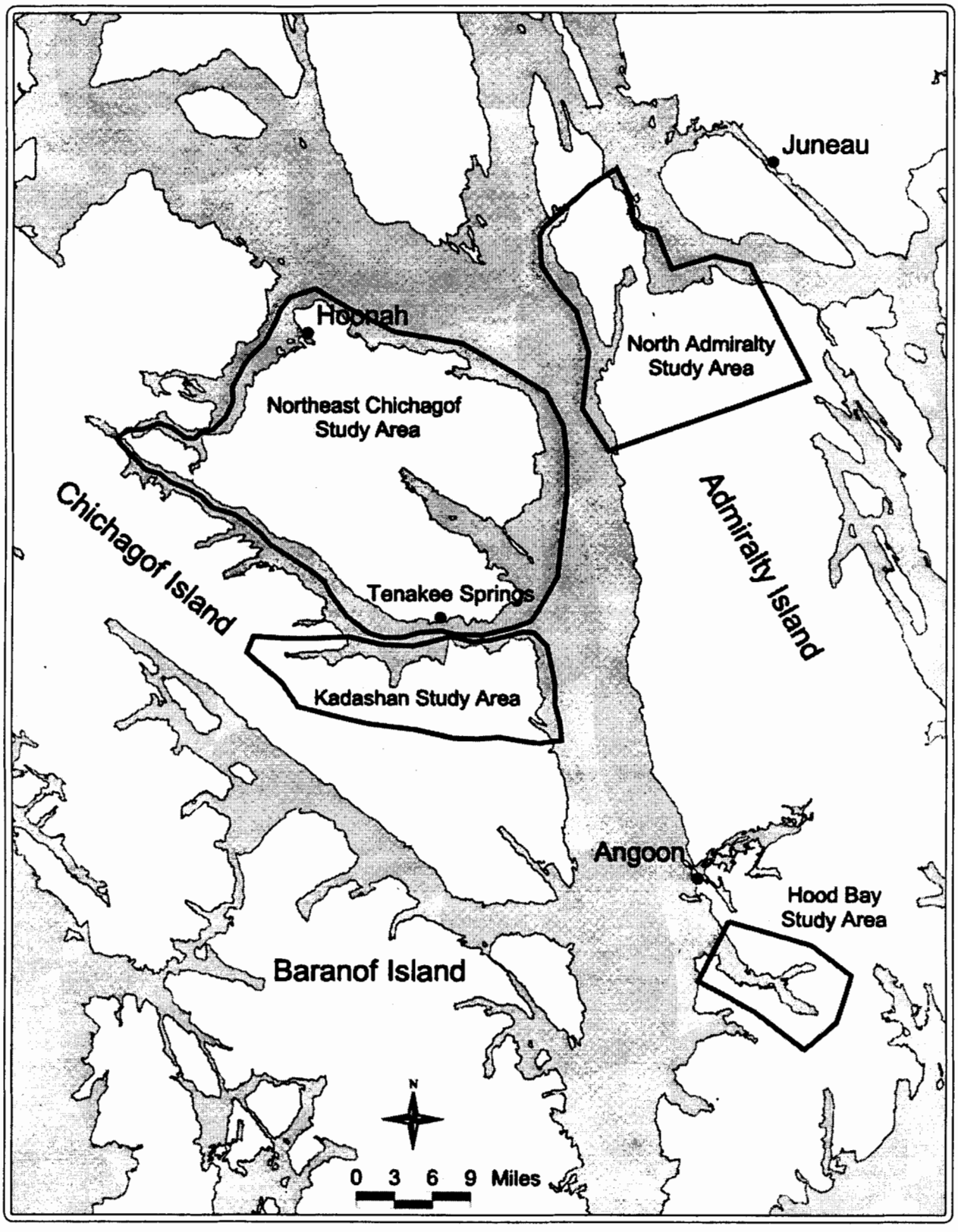


Figure 2 Locations of ADF&G brown bear research areas in Unit 4

NORTHERN ADMIRALTY ISLAND & KADASHAN STUDIES

In 1981, John Schoen and LaVern Beier of the ADF&G began capturing, marking, and radio-tagging brown bears as part of a long-term study of bears in the Hawk Inlet area of northern Admiralty Island (Fig. 2). The initial impetus for their research was development of the Greens Creek mine on northern Admiralty. Their objectives were to determine home range sizes, seasonal movement patterns, the types of habitats used by brown bears, and the effects of mining development on brown bears. They also wanted to find and describe denning sites. By following and relocating bears, particularly sows and their cubs, over the years, they planned to determine reproductive rates and relate them to habitat types and hunting harvest levels.

In 1983, Schoen and Beier expanded the radio-telemetry project to bears on southeastern Chichagof Island including the watersheds of Trap Bay, Basket Bay, Corner Bay, Crab Bay, and the Kadashan River. Twenty-seven bears were captured and subsequently tracked to examine the effects of logging on bear habitat selection as well as seasonal habitat use, mortality, reproduction, denning sites, and other population information. Except for Kadashan, most of the area had experienced extensive clearcut logging and roading. A logging camp with an open dump was located at Corner Bay. The field work portion of southeastern Chichagof research project was ended in 1989 and radiocollars were retrieved.

The following is a summary of the major findings of these two research projects.

Demographics – Previous brown bear research in Alaska and elsewhere has found that, in general, brown bears mate from May through July. The cubs, weighing less than a pound, are born the following January and February in a winter den. Litters range from one to five cubs with two being most common. Elsewhere, cubs generally remain with their mother for two years. In Unit 4, however, cubs normally remain with their mother until they are three or even four years old (Beier, et. al. 1996)

Brown bears have the lowest reproductive rates of all land mammals in North America, and Southeast Alaska brown bears begin breeding older and have longer breeding intervals than those found for some other brown bear populations. In Southeast Alaska, Schoen and Beier (1990) found that no sows younger than age 7 produced a litter and the average age for a sow with her first litter was 8.1 years. For brown bears elsewhere the most common breeding age is 5 (e.g., Knight and Eberhardt 1985, Reynolds et al. 1987, Schoen and Beier 1990). On Admiralty and Chichagof islands, the average interval between successful litters

was 3.9 years, longer than for brown bears elsewhere (Eberhardt 1990). Several adult females failed to produce young for five to six year periods. In any given year, 82% of the marked Admiralty Island sows did not produce cubs.

Not only are bear reproductive rates low, but Schoen and Beier found high cub mortality on Admiralty Island. Eleven out of 46 cubs died in the first year of life on Admiralty. There is an important difference between how many cubs are born into a population and how many are successfully weaned and become adults. In a high-density, highly competitive area like Admiralty Island, it is likely many more cubs are produced than are successfully recruited into the adult population.

Despite the difficulties of determining the fate of each bear over several years, Schoen and Beier (1990) found that a minimum of 28% of the 95 brown bears captured on their Admiralty and Chichagof islands study areas died during 9 years of their studies. Of those deaths, 82% of their non-capture-related mortalities were the result of some human factor. This indicates that Southeast Alaska brown bear populations are strongly affected by humans, even in roadless areas such as Admiralty Island.

Home Range Size — Brown bears in southeast Alaska have small home ranges compared with other brown/grizzly bear populations. They have overlapping home ranges averaging about 25,000 acres (40 sq miles) for male brown bears on Admiralty Island. Female home ranges were much smaller, averaging about 9,000 acres (14 sq miles) on Admiralty Island and 6,000 acres (9 sq miles) on Chichagof Island. Bear survival depends for the most part on an adequate supply of food. The availability of food is dependent on a mix of habitats that bears use during the year. Most life requirements such as adequate old-growth forest patches, salmon streams, berry patches, alpine and denning habitat will be contained within a bear's annual home range.

Seasonal habitat use — Habitat use by brown/grizzly bears varies considerably depending upon the types of ecosystems they inhabit in North America. The following summary of their habitat use is based on 4,059 relocations of 95 brown bears that were radiocollared on northern Admiralty Island and Chichagof Island during the period 1981 through 1989. Habitat use by radio-collared brown bears varied seasonally and is considered a response to seasonal differences in food quality and availability.

Most brown bears were found to den in sites above 1,000 feet elevation and emerge from dens in April or May. Many bears then move to low-elevation slopes. Bears prefer plants on these sites which are the first to green up in the spring. During early summer (mid-June through mid-July), most bears move to forested slopes and alpine/subalpine meadows where they forage on new plant growth.

Bears concentrate at low elevations along coastal salmon streams from mid-July through early September. During this late summer season, 54% of all radio relocations of bears occurred in riparian (streamside) forest habitat of predominantly Sitka spruce trees with a devil's club (*Oplopanax horridus*) understory. During this season, 66% of all bear relocations occurred no farther than 525 feet from anadromous fish streams. Bears used this habitat for fishing along river banks, for foraging on succulent vegetation and berries, and for security and thermal cover.

Although more than 85% of bears are associated with salmon streams in late summer, some bears (primarily females) do not move to the coast to fish. These bears (termed "interior bears") remain in interior regions of the island throughout the year, foraging primarily on plants and berries in subalpine and avalanche slope areas. By mid-September, bears which feed on fish return to forests, avalanche slopes, and subalpine meadows above 1,000 feet elevation to feed on currants and devil's club berries before they den.

Denning – Winter denning begins in October and November. Based on locations of 121 den sites of radiocollared bears from Admiralty and Chichagof islands, the average den was quite high and steep at 2,100 feet elevation on a 35 degree slope. About half (52%) of these dens were in old-growth forest. Although denning in caves was common on Admiralty Island, many bears excavate dens under large-diameter old-growth trees or into the bases of large snags (standing dead trees).

Food habits study

During the late 1980s, graduate student/ADF&G biologist Tom McCarthy studied the seasonal food habits of Admiralty brown bears. Although classified in the order Carnivora (meat eater), brown bears are omnivorous, that is they are both carnivores and herbivores (plant eaters), eating a variety of foods. McCarthy (1989) found that during spring, brown bears feed mostly on sedges (*Carex* species), the new growth of other plants, roots, and deer. Sedges and salmon are the major foods consumed during summer, although bears also use skunk cabbage (*Lysichitum americanum*), devil's club berries (*Oplopanax horridus*), and other plants, berries, and roots. During fall, bears eat salmon, devil's club berries, skunk cabbage, sedge, beach lovage roots (*Ligusticum* species), and currants (*Ribes* species). Where bears were found corresponded closely to the seasonal

John Hyde

abundance and quality of the food items listed above. Because bears have relatively inefficient digestive systems typical of meat eaters and are active for only part of the year, they must exploit the most productive feeding sites available to survive. Brown bear feeding patterns and habitat use often bring them into conflict with humans who use these same lands.

Northeast Chichagof Island study

A marked increase in the brown bear hunter harvest and defense of life and property (DLP) kills on northeastern Chichagof Island coupled with increased human access to that portion of the island from the recently expanded system of logging roads prompted research to be focused on that part of Unit 4 in 1989 (Fig. 2). Again, radio-telemetry was used to study home range size, habitat selection, population characteristics, patterns of human access and brown bear mortality, and the ecology of bears associated with the Hoonah dump. Kimberly Titus and LaVern Beier of the ADF&G began this study with cooperative funding and assistance from the U.S. Forest Service for the first few years.

Demographics - Titus and Beier (1992) captured over 50 brown bears on northeast Chichagof Island older than age 4. Of those, a third (33%) of both males and females were older than age 10. Half the males captured (48%) and 40% of the females were age 6 or younger. One fifth of males (20%) and 27% of females were between 7 and 10. This age structure is similar to that reported for the northcentral Alaska range (Reynolds 1990). From a conservation and management standpoint, it is important to note that brown bears are long-lived and that a significant portion of the adult population is composed of bears older than 10 years old.

Survival - Annual survival rate estimates for the whole Northeast Chichagof population based on the fates of 61 radiocollared adult female and 30 adult male brown bears were 96% and 84% respectively during 1990–1994 (Titus and Beier 1994). The overall annual survival rate for females was high and similar to that of 92% found for a naturally regulated, unhunted population in Katmai National Park (Sellers et al. 1993). It appears to be higher than the 87% female survival rate for a hunted brown bear population on the Alaska Peninsula (Sellers 1994).

The lower male annual survival rate is attributed to hunters' selective harvest of male bears, larger male home ranges, greater movement of juvenile males, and male bears' attraction to the Hoonah dump during this period, all of which exposed them to greater contact with humans. Sellers et al. (1993) found a male survival rate of 96% in an unhunted population suggesting that male bear mortality is similar to females in a naturally regulated population. Male mortality may have been underestimated because some bears were lost track of and

some collars switched to mortality mode in places where they could not be retrieved. Researchers concluded that the patterns of human-caused mortality have resulted in fewer males than females in the bear population on Northeast Chichagof Island (Titus and Beier 1994).

Of 93 brown bears radiocollared and followed on Chichagof during 1989–1994, 11 have been killed, including 5 taken legally by hunters, 1 killed illegally, 2 killed in defense of life or property, and 3 whose cause of death could not be determined. Each of those 3 cases may have been human-caused because one bear was found near a beach and 2 were found less than 200 yards from an open road. Beier et al. concluded that at least 8 of the 11 deaths were human-induced. Results support the overall trend of increasing nonhunting human-caused brown bear mortality on the northeast portion of Chichagof Island in recent years (Fig. 3). During this period additional nonhunting mortality of unmarked bears was also reported in and around the community of Hoonah and its nearby road system. (Beier et al. 1996).

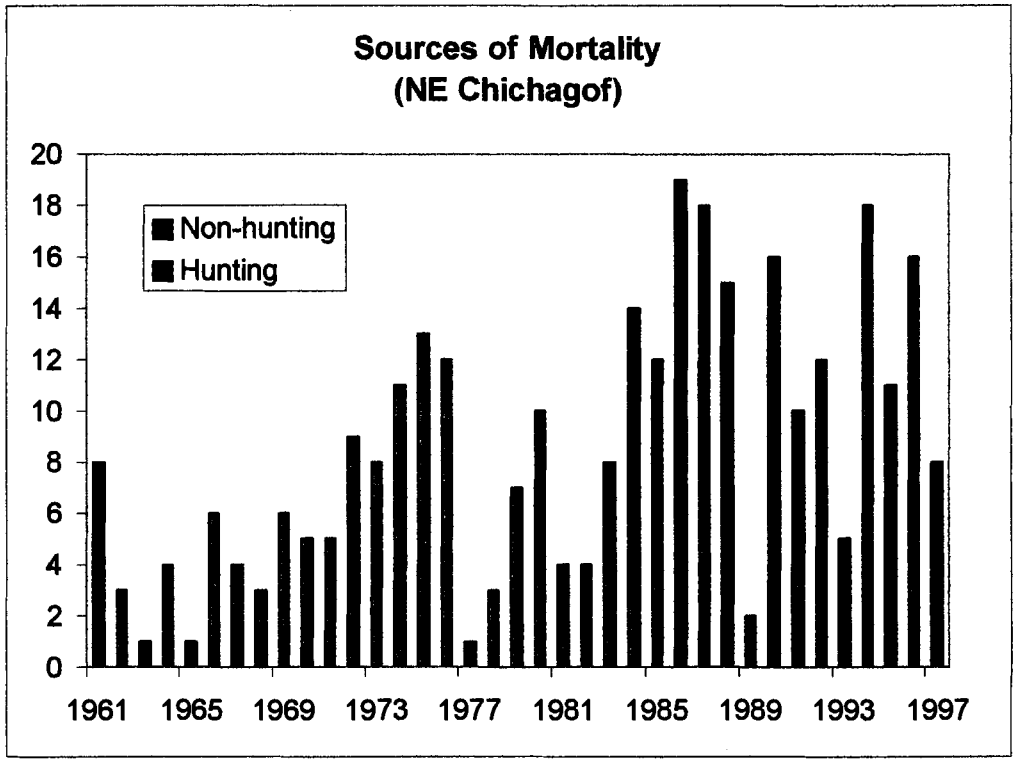


Figure 3 Nonhunting mortality on Northeast Chichagof Island

Habitat use and development effects - On Northeast Chichagof, overall and seasonal uses of habitats were similar to those found on Admiralty. The exceptions were: late summer riparian use on Chichagof was significantly less than that found on Admiralty (31% and 54% respectively); and, Chichagof bears

used avalanche slopes in the fall more than Admiralty bears (43% and 25% respectively). Perhaps riparian habitats were less available on Chichagof or a larger percentage of "interior" bears were in the Chichagof sample. As in the Kadashan study, brown bears avoided clearcuts, using them only 3% of the time in both study areas. No bears were found in second-growth stands (Titus and Beier 1994).

ADF&G research also found that the density of bears on Northeast Chichagof (0.8 bears/sq mi) was 21-28% lower than was found on northern Admiralty (1.1 bears/sq mi) (Miller et al. 1997). Both study areas have approximately the same mix of habitats, abundant salmon streams and other food resources. The habitat differences that do occur were not great enough to explain the difference in density. There are great differences, however, in the extent of human development in the areas. The Northeast Chichagof study area has established communities, recent roadbuilding, and extensive logging, conditions which are generally absent on northern Admiralty. As a result, Titus and Beier (1993) concluded that increased access, logging, and habitat change are responsible for the lower bear density on Northeast Chichagof. This conclusion was supported by a panel of brown bear experts convened during revision of the Tongass Land Management Plan to assess risks to brown bears.

Dispersal – An analysis of the extent of some bears' movements in Unit 4 was done by Beier et al. (1996). They documented the distance between the original place bears were captured and where they died to calculate estimated mean travel distances for northern Admiralty, Kadashan, and Northeast Chichagof bears. On average, males moved farther than females; 9.4 miles compared to 5.4 miles. This can be partly explained by the fact that males have larger home ranges than females. In adult bears (those 7 years old or more), the difference in movement distances between males and females is greater, 5.7 miles vs. 1.9 miles. Subadult bears (6 years or younger at first capture) of both sexes traveled farthest; the average for males was 11.1 miles and for females 10.6 miles. Dispersal from their maternal home ranges probably accounts for the higher means of the younger bears.

Because of time and funding constraints researchers did not regularly try to find radiocollared bears outside the study areas during research projects. Study animals who died outside of the study area, however, provide solid evidence that bears travel widely, at least on Admiralty Island. Researchers have documented the deaths of five marked bears outside the southern boundary of the Admiralty Island study area. Other marked bears have been seen alive south of the study area. The greatest documented distance traveled by a bear on Admiralty was 53 miles by a male from Greens Creek to Hood Bay. Others were found on the Glass Peninsula. Average distance moved by Admiralty bears was 9 miles, and juvenile males on Admiralty traveled farther on average than any other sex or age class.

Bears from the Admiralty study area had larger mean distances between original capture locations and place of death than those on Northeast Chichagof. This probably reflects the geography of the areas. Dispersal from the Admiralty study area is easier because the southern boundary is not a barrier to bear movements. Northeast Chichagof is nearly an island, however, with only a single, narrow land connection to the remainder of Chichagof. No marked Northeast Chichagof bear has been recovered dead outside the study area. One marked bear traveled from the Northeast Chichagof study area to the south side of Tenakee Inlet. It was not found again.

Although brown bears are strong swimmers, water barriers such as those surrounding Northeast Chichagof are apparently significant obstacles to movements. Bears must continue to have access across the land bridge at the Port Frederick–Tenakee Inlet portage that connects Northeast Chichagof bears to those on the remainder of Chichagof Island. Because current population interchange appears minimal, management of Northeast Chichagof bears should recognize this isolation (Beier et al. 1996).

Current status of Unit 4 bear research

Since the ending of the active field research portion of the Admiralty and Northeast Chichagof studies in 1995, ADF&G has maintained radio-collars on over 70 bears and transitioned into a program that monitors reproduction, mortality, and other population dynamics on both the Admiralty and Northeast Chichagof study sites.

Information from Unit 4 research was used by biologists of several agencies to develop a habitat capability model for brown bears in Southeast Alaska. This model was used by the Interagency Viable Populations Committee to recommend an overall strategy for maintaining brown bears in the region. ADF&G has used information from the research to develop guidelines for managing hunter harvest and to develop recommendations on other ways to maintain healthy populations of brown bears. Those guidelines and recommendations appear elsewhere in this document.

The future of continuing research and monitoring on Unit 4 brown bears that meets high standards is uncertain. Despite the recommendation by a panel of bear experts that brown bears continue to be monitored and further research be done as part of the new forest plan implementation, funding in recent years has come solely from ADF&G.

SUMMARY

ADF&G considers the following research findings to be key to Unit 4 brown bear and brown bear habitat management.

- Based on capture-mark-resight methods, brown bears occur in very high densities on Admiralty (1.1 bears/sq mi) and Chichagof islands (0.8 bears/sq mi). The density estimate for the northeast portion of Chichagof Island was significantly lower than that for northern Admiralty Island.

- Unit 4 brown bears show strong seasonal patterns of habitat use. Most bears den above 1,000 feet elevation and move to low-elevation slopes in late April and May. In early summer (mid-June through mid-July), bears move up in elevation to forested slopes and alpine/subalpine meadows where they forage on new plant growth. As chum and pink salmon begin to move into streams in mid- to late July, most bears concentrate at low elevations in lowland forests and riparian habitats. The maintenance of these riparian areas and forested buffers along these salmon-spawning streams is considered a critical component of maintaining viable and well-distributed brown bear populations. By early September most brown bears move to upland old-growth forest stands and avalanche slopes to feed on ripening berries. Bears spend little time in clearcuts and do not appear to use second growth forest.

- Reproductive rates for brown bears on Admiralty and Chichagof islands are similar. Overall mean litter size for cubs of the year was about 1.9. Mean interval between successful litters for adult female bears was 3.9 and 4.1 years based on two analyses. The earliest age of first production of cubs was 6 and

LaVerne Beier

mean age of first litter was 8.1 years. In any given year, 40-50% of adult female bears were without cubs. The late age of first reproduction and the long interval between successful litters suggests a lower reproductive rate than some other brown bear populations, despite the high bear density. The demographic data collected on Admiralty and Northeast Chichagof stress the importance of careful management because the consequences of a management error can be high (Miller 1990*a*). This is because few cubs are produced in any given year, at least 8 years are required for females to become important contributors to the next generation, females only produce cubs once every four years, and loss of too many adults will slow the ability of the population to provide for adequate recruitment.

- Human-caused mortality is the dominant cause of mortality in adult brown bears. Based on our sample of radiocollared bears, a higher portion of mortality was attributed to defense of life or property and illegal kills on Chichagof Island than on Admiralty Island. Road access and development activities were highly correlated with bear mortalities on the Northeast Chichagof road system.

- Annual survival rate estimates based on 61 radiocollared adult female and 30 adult male brown bears were 96% and 84% from Chichagof Island during 1990–1994. The differing survival rates between sexes and the higher male mortality rate is not unlike other brown bear populations where much of the mortality is human-caused, either through hunting or development-related activities. Across Unit 4, patterns of bear mortality combined with our knowledge of reproductive rates and population recruitment suggest that a 4% annual human-caused mortality rate is a conservative management approach that, if not exceeded, will sustain high bear densities.

- Estimates of brown bear dispersal and movements suggest that juvenile males disperse greater distances than other sex and age classes. Brown bears marked on the northern Admiralty Island study area have dispersed to Glass Peninsula and Hood Bay, indicating that the island contains one large brown bear population. Bears on Northeast Chichagof, on the other hand, appear to face significant barriers to movement and interchange with other bears on Chichagof. Only one bear is known to have left Northeast Chichagof in eight years of research there. Management of the Northeast Chichagof bears should recognize this isolation.

BROWN BEARS AND LAND MANAGEMENT

INTRODUCTION

Brown bears are animals of wild lands. History shows they do not do well in proximity to humans or extensive human development. Consequently, management of lands in brown bear country has a great effect on the welfare of brown bear populations. In Unit 4 most brown bear habitat is managed by the USDA Forest Service. Native corporations own and manage large private tracts on Admiralty and Chichagof islands. The chief land management issues affecting bears in Unit 4 are loss and alteration of habitat from logging and the disturbance that accompanies human settlement, development projects, and their associated roads. Habitat loss and disturbance activities are distinct problems. Because they typically accompany each other during resource development, solutions to them are often intertwined.

HABITAT ISSUES

Loss and alteration of habitat is not an issue everywhere in Unit 4. The major islands in Unit 4 are subject to varying amounts of timber harvest and other habitat alteration. Most of Admiralty Island is Wilderness, but a large mine development operates on the north end of the island and significant clearcut logging on private land has occurred in three watersheds. About half of Kruzof Island and a quarter of Baranof Island are still in land management prescriptions which allow logging. More than half of Chichagof Island is subject to logging (USDA Forest Service 1997*b*).

The area of most current concern in Unit 4 in regard to brown bear habitat loss is eastern Chichagof Island, particularly Northeast Chichagof Island. Logging on both private and public lands has resulted in clearcuts and roads in every watershed (Fig. 4). The major roads are closely associated with major fish streams and many stream buffers are quite narrow. The new Tongass National Forest management plan identified and mapped large 40,000 acre reserves across the forest that were designed to be non-roaded, non-development tracts for wildlife. Bears were an important reason for adopting the reserve strategy. On Northeast Chichagof, however, no large unroaded, uncut area remains and the mapped large reserves contain extensive areas of second growth and road systems. Concern about long-term effects of this level of logging on bears is elevated because the northeast Chichagof peninsula may function as a separate island with regard to bear populations. ADF&G biologists believe little migration of bears occurs on or off the peninsula. In eight years of research only one marked bear left Northeast Chichagof.

Foremost among habitat issues concerning bears is the effect of development on anadromous fish streams and the riparian forest habitats associated with them. For half a year while hibernating in their dens, bears must live off the fat reserves they are able to build during the other half year. The major reason the ABC islands can support such dense populations of bears is the presence of salmon streams which provide a readily accessible, efficient way for bears to build their fat reserves. Bears use forests along streams for travel, for loafing between fishing sessions, and for hiding and escape cover from other bears and humans. Riparian forests also contain currants, devil's club berries, and salmonberries which bears eat. ADF&G research found 66% of all bear use during fishing season was within 525 feet of fish streams. Protecting the productivity of fish streams and the nearby habitat which bears use while fishing is one of the chief habitat issues that influences bear survival in Unit 4.

Fish stream productivity can be adversely affected by sedimentation entering the stream directly or running down tributaries. The sediment can come as runoff from logged areas, road construction, poor road maintenance, unstabilized stream banks, and slope failures. For travel corridors, loafing areas, and hiding and escape cover, bears need riparian forest preserved in buffers. It's important to note that bear use buffers may need to be wider than those needed to protect stream productivity.

Bears also use old growth upland forest habitats, particularly in the fall. Some use higher elevation old growth for denning. The current preferred logging method in Southeast Alaska is clearcutting. ADF&G research has found that brown bears use clearcuts rarely, only about 3% of the time (Titus and Beier 1994, Schoen and Beier 1990). ADF&G biologists believe bears make limited use of clearcuts in Southeast Alaska because other sites (alpine/subalpine, wetlands, riparian old growth, and avalanche slopes) provide more nutritious foraging and better cover habitat than clearcuts. For example, the devil's club berries, currants, and salmonberries, which bears prefer, are more abundant in riparian and avalanche slope habitats than in clearcuts.

Second-growth forests which replace clearcuts after 30 years, were not used by bears at any time of year during ADF&G research projects (Titus and Beier 1994, Schoen and Beier 1990). Because younger second-growth conifer stands in Alaska produce minimal understory vegetation, second growth provides poor foraging habitat for herbivores and omnivores like bears. The standard timber rotation cycle in Southeast Alaska is 90 to 125 years. Eventually second-growth forests will dominate about 75% of lands subject to clearcutting. The wholesale replacement of old growth upland forest habitats with clearcuts and eventually second growth in some drainages reduces the carrying capacity of the habitat as a whole. The net effect of clearcut logging of old growth in Unit 4 will be a

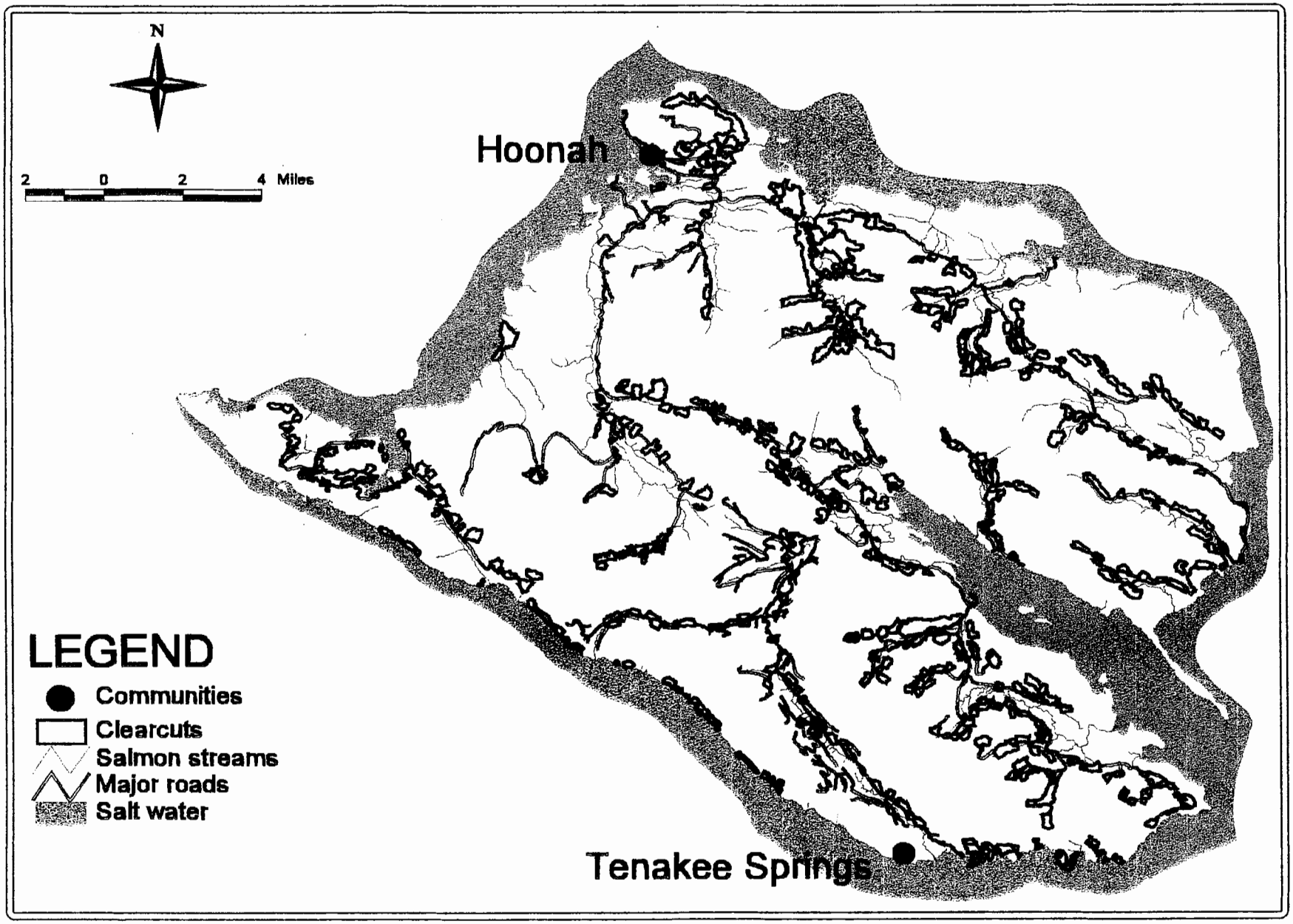


Figure 4 Logging, roads, and major streams on Northeast Chichagof Island

long-term reduction in brown bear carrying capacity. As carrying capacity declines, risks to long-term survival of populations increase. A smaller carrying capacity also means fewer bears will be available for hunting and viewing.

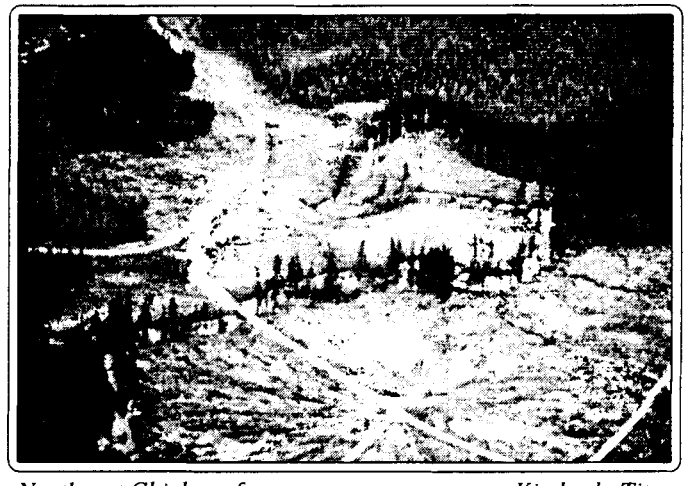
Roads and development

Brown bears, which range over extensive areas (from 3,500 to 50,000 acres) should be considered creatures of landscapes rather than of specific habitat types. Aside from habitat degradation, resource development like logging, mining, hydroelectric development, and tourism, must also be evaluated in terms of bear-human interactions. Resource development in the generally wild, undeveloped areas that characterize brown bear habitat significantly improves human access to those areas and so increases disturbance as well as direct human-induced mortality of bears. Roads are usually detrimental to bears because they increase the opportunity for human-induced mortality of bears through legal hunting, defense of life or property kills, and illegal killing (Knight 1980, Peek et al. 1987, Rogers and Allen 1987, McLellan and Shackleton 1988, Brody and Pelton 1989, Schoen 1990). Although it is possible to manage the legal hunting of bears, it is difficult to control illegal kills, wounding loss, and defense of life or property kills. Once an area is roaded for one development activity, it often results in additional developments which increase human-bear interactions, and ultimately reduces the area's capability for supporting viable bear populations.

The dense rain forest of Southeast Alaska provides more security cover for bears than more open habitats in the Rocky Mountains or northern Alaska. Road building activities in the Greens Creek drainage of Admiralty Island displaced fewer bears than expected, presumably because of the security cover provided by the dense forest. In Southeast Alaska, bears may remain closer to development activities than they do elsewhere because of the dense forest cover. As those bears become habituated to humans and/or associate humans with food (garbage), human-bear interactions will increase and result in higher bear mortality. Human garbage has been implicated as one of the major contributors to bear attacks on humans and ultimately the reason that many garbage-habituated "problem" bears must be destroyed (see below).

Arterial and collector roads accessible to vehicles have greater impacts on bears than local roads and roads closed to vehicular traffic. Roads closed administratively with gates or excavated pits would still have some level of off-road vehicle traffic. Although less detrimental to bears than roads accessible to vehicles, roads closed temporarily (with gates) pose greater impacts than permanently closed roads (through bridge removal). All roads, regardless of closure, still have the potential for supporting more people traveling on foot which can also place pressure on bears.

The combination of roading and logging may be particularly detrimental. A radio telemetry study comparing roaded and unroaded watersheds on Chichagof Island found that brown bear locations were much farther away from the salmon stream in the highly roaded and clearcut watershed than the uncut and pristine watershed. This may mean bears are not making optimal use of the salmon food resource in heavily roaded and cut drainages. The highly roaded and clearcut watershed lacked cover and forested stream zones. Brown bears continue to make use of streams in heavily logged watersheds. They seldom use the clearcut habitat, but make frequent use of roads and the patches of remaining forest. Brown bears were much closer to secondary and blocked roads than primary roads in the roaded watershed indicating that they do not avoid these locations. This results in more frequent bear-human encounters and increases mortality rates (Schoen, et al. 1994).



Northeast Chichagof *Kimberly Titus*

Brown bear mortality on Northeast Chichagof Island supports the view that increased human activity reduces brown bear numbers and habitat capability. Titus and Beier (1992) documented that the number of bears killed in autumn was directly related to the total length of roads built on northeastern Chichagof Island during the period 1978 to 1989. An additional number of bears were likely killed illegally during that period as well.

Larger communities likely have greater impacts on brown bears than smaller communities. Brown bears are rarely observed in or near major cities or towns in southeast Alaska, but they are much more frequently encountered near small villages. Even though suitable habitat exists near the larger communities, it is not used because the bears are either killed or displaced by human activity. Similarly, permanent camp sites used to support development would have more effects than temporary camps. Clearly, the effects of human activity and development on bears need to be incorporated into any analysis of the effects of land management activities on brown bears.

One effect of development activities in remote areas is an increase in hunter harvest along with defense of life and property (DLP) kills. Depending on the size and permanence of camps the increase in hunter harvest can be substantial and prolonged and change harvest patterns over a large area. Brown bear managers in British Columbia routinely close bear hunting while an area is being logged to guard against overharvest. Because of ADF&G concerns about the effects of its development on bears on north Admiralty, Greens Creek Mining Co. prohibits hunting by employees while they are at camp or on duty status. ADF&G believes this voluntary company policy along with a strict garbage control policy has helped reduce the potential detrimental effects of the mine on bears. We recommend it be adopted by all camp managers.

Alpine and subalpine bear habitats may be increasingly affected by mining and tourism activities. Recent proposals have included mineral drilling exploration and heli-hiking tours in Unit 4 alpine areas. The alpine is a critical seasonal habitat for bears. Although isolated, infrequent human activity is of little concern, the cumulative effects of regular and increasing activity can be detrimental. Scheduling activities during seasons when the majority of bears are elsewhere provides some mitigation, but some bears remain at high elevations most of the year (Schoen and Beier 1990). The welfare of these "interior" bears depends on their foraging success in alpine and subalpine habitats.

The action usually proposed in timber sale documents to mitigate bear losses from logging and roading is to change hunting regulations to ensure bears are not overharvested. The ADF&G has recommended such changes where appropriate and the Board of Game and Federal Subsistence Board have adopted them. With continued logging expected on northeast Chichagof and elsewhere, hunters must expect more restrictive regulations in the future. At some point hunting restrictions may not be sufficient mitigation for losses caused by logging and development. Even in the absence of legal hunting, many bears will undoubtedly be killed in future control actions around rural communities and camps (particularly around garbage dumps), by deer hunters in defense of life, and by an undocumented level of poaching.

ADF&G believes strongly that careful road and access planning is essential to limiting brown bear mortality in Unit 4. Forest planners and managers need to recognize and remain mindful of the habitat and development factors in bear survival. The public must make known what tradeoffs in bear carrying capacity and hunting it will accept in return for continued forest development.

SOLID WASTE AND BEARS

The combination of increased road access and bears becoming habituated to garbage dumps and people is a major concern of bear managers in coastal forests of British Columbia and Southeast Alaska. Garbage dumps without incinerators and/or bear-proof fencing, attract bears from long distances. These bears become habituated to humans and human foods and are more prone to interact with humans, thus decreasing their probability of survival.

The current ADF&G Division of Wildlife Conservation (DWC) policy on solid waste management is based on the assumption that non-hunting human-related mortality such as illegal and defense of life and property (DLP) kills contributes to excessive mortality. Bears are often attracted to human settlements because of improper food storage and/or garbage disposal. These animals are then destroyed with no measures taken to correct the human activities creating the problem. The public frequently expects DWC to either kill or relocate problem animals. In chronic problem areas, DLP mortality could become a population "sink", countering reproduction in surrounding areas and possibly contributing to lower population densities in a wider area.

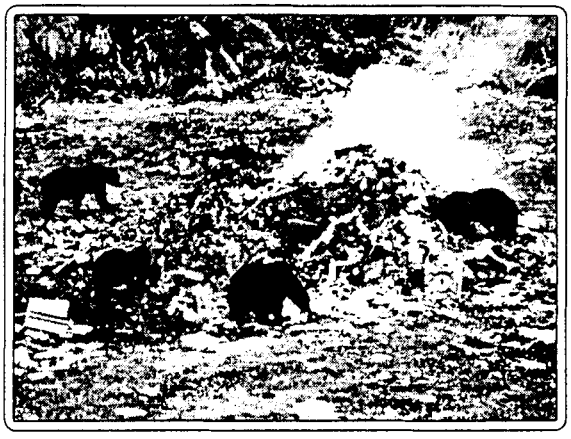
As a result of observations made in 1984 during brown bear research, ADF&G highlighted problems at the Corner Bay and Kennel Creek logging camps on Chichagof Island in a letter to the Alaska Department of Environmental Conservation (ADEC). In January 1985, ADF&G and ADEC met with the US Forest Service about improving solid waste treatment at logging camps and other USFS permitted sites. The Forest Service agreed at that time to require all solid waste sites under Forest Service permits, including those at logging and other resource development camps, to meet all state and federal rules and regulations.

Subsequently, ADF&G recommended installation of solid waste incinerators at Corner Bay camp and other camps throughout the Tongass National Forest. In September 1987, ADF&G, ADEC, the Alaska Department of Public Safety, and the USFS issued a "Joint Policy Statement and Action Plan for Southeast Alaska" (see Appendix) in which they agreed to work together to meet the following objectives: reduce habituation of all Southeast Alaska bears to garbage, reduce potential bear/human confrontations, and decrease overall problems caused by improper handling of solid waste. In March 1990, ADF&G/DWC issued a "Policy on Solid Waste Management and Bears in Alaska" (see appendix) with the objectives of reducing bear/human interactions and confrontations, providing consistent policy guidance to ADF&G staff, and providing guidelines to other agencies and the public.

ADF&G has worked with ADEC, the U.S. Environmental Protection Agency, and local communities to minimize attracting bears into areas where their presence conflicts with human safety. We have advocated community efforts to deny bears access to garbage (baling, incineration, daily garbage burial, bear proof garbage containers, and mandatory garbage pick-up), and preventing bear-human contact (fencing of and controlled periods of public access to dumps). Communities need to also encourage individuals to store food and garbage in such a manner that it is inaccessible to bears. ADF&G needs to increase funding to better educate the public about bear behavior so bears will not be destroyed in non-threatening situations.

It has been ADF&G policy that bears will generally not be transported and released elsewhere. Home ranges of brown bears are large and their ability to return are well documented. Transplanted bears frequently cause problems in the new area or along their return route. The ultimate responsibility for resolution of most bear problems rests with the public; but illegal kills and the non-justified destruction of bears will result in appropriate citations.

Most small communities and settlements in Unit 4 do not have public landfills that attract bears. Two communities, Hoonah and Angoon, have had open raw-garbage landfills that have attracted large numbers of brown bears, resulting in a number of bears being killed. The Hoonah landfill once had as many as 13 different bears regularly feeding on garbage. In fall 1996, Hoonah took steps to improve its landfill operation. Garbage is now confined to a small area and burned and buried daily in the landfill. Bears are still attracted to the site but far fewer than in the past. A new fall hunting season to allow harvest of displaced dump bears in the immediate Hoonah area had no bears reported killed in fall 1997.



Hoonah landfill 1992 *Kimberly Titus*

As long as its daily operation is maintained conscientiously, Hoonah's improved treatment of garbage should lead to increased human safety and fewer bears killed, at least in the short term. Angoon's open landfill still attracts a large number of bears, including sows with cubs, and remains a safety concern for both humans and bears. Over the long-term, we believe the best solution for dealing with community waste in bear country is incineration or barging the waste to landfills or incinerators elsewhere.

TLMP CHANGES AFFECTING BROWN BEARS

In 1997, the Tongass Land Management Plan (TLMP), directing management of the national forest, was revised. Some changes were adopted which improved habitat management for brown bears (see USDA Forest Service 1997*a*:4-113 and 4-114). Although some changes fell short of recommendations made by ADF&G biologists they represent a positive step in better land management for bears.

Two panels of bear experts convened in 1996 and 1997 to rate the relative risk to brown bear viability posed by different TLMP revision alternatives agreed on the importance of fish streams to brown bears. Summaries of the panel discussions indicate that a primary habitat concern centered around protecting fish habitat and providing wider stream buffers along anadromous fish streams for bears (Iverson 1996, Meade 1997) . They recommended minimum 500-foot no harvest-no road riparian buffers be retained on all anadromous streams in brown bear areas unless evaluations indicated they were not needed. Current TLMP standards and guidelines for brown bears include buffers of "approximately" 500 feet in important brown bear foraging sites committing the Forest Service to putting the buffers only where an evaluation finds they are needed.

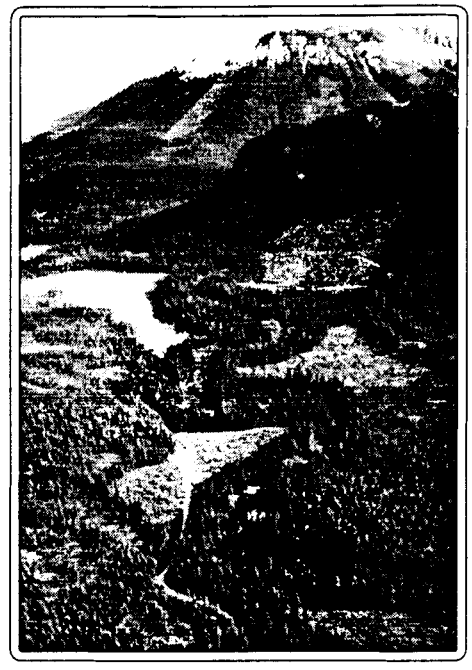
Roads and access management were also identified as a primary concern by the two panels. The risks posed by roads include increased human access to bears and damage to salmon streams. Panelists agreed with an ADF&G conclusion that increased access, logging, and habitat change are responsible for the lower bear density on northeast Chichagof than on Admiralty. They recommended retaining unroaded watersheds in a roadless condition, constructing necessary roads more than 500 feet from fish streams with perpendicular stream crossings only, and closing roads in high priority watersheds (Iverson 1996). In the TLMP Revision the Forest Service committed to developing road access and travel management plans, and to manage road use in brown bear concentration areas to minimize bear/human encounters.

The TLMP Revision also instituted a system of old growth habitat reserves which was originally recommended by an interagency team of biologists in 1992 and strongly supported by a peer review of that team and by the brown bear risk assessment panels. The reserves are intended to provide habitat refuges for brown bears and other old growth dependent species that guarantee the species will continue to have well-distributed, viable populations throughout their ranges in the National Forest. ADF&G's management mandate is to maintain not just viable bear populations but populations that are healthy and large enough to be used by the public. Although ADF&G strongly supports the concept of habitat reserves, we have serious concerns, particularly on eastern Chichagof Island, that the current reserve system may not be adequate for the long-term conservation of healthy and useable brown bear populations.

The TLMP Revision commits the Forest Service to annual monitoring of brown bear populations but ADF&G believes the estimated cost and the methods proposed for the monitoring are inadequate.

The Forest Service also:

- recommitted to working with the ADF&G, communities, and other agencies to insure proper solid waste disposal in brown bear areas.
- committed to "working with ADF&G to develop and implement a brown bear management plan which considers access management and seasons and bag limits to manage brown bear mortality rates within sustainable levels".



Kimberly Titus

GUIDELINES FOR MITIGATING AFFECTS OF RESOURCE EXTRACTION INDUSTRIES ON BROWN BEAR POPULATIONS

ADF&G has proposed guidelines for reducing the effects of development on brown bears. The following guidelines emphasize managing human activities to reduce bear-human interactions. Fewer interactions should decrease the chances of injuries to humans as well as lessen the detrimental effects on bears. The guidelines were developed as a result of bear research associated with the Greens Creek Mine on Admiralty Island and logging at Tenakee Inlet on Chichagof Island.

Camp sites:
New construction for camp sites (permanent and seasonal) should never be located closer than 1 mile from sites of seasonal brown bear concentrations (anadromous salmon streams, estuarine sedge meadows, etc.).

Firearms:
In large industrial camps (logging and mining camps, etc.), camp policy should discourage the carrying of personal firearms by all employees except foremen and security personnel.

Hunting, fishing, and backcountry recreation:
Hunting by industrial camp personnel should be prohibited by camp policy at or near the camp site while employees are on duty status. Fishing along anadromous salmon streams should also be discouraged in areas of seasonal bear concentrations. Hiking, berrypicking, photography, and other outdoor activities should be minimized outside the camp compound and particularly in areas of seasonal bear concentrations.

Feeding bears and littering:
Attracting and habituating bears to human foods is one of the most significant causes of bear-human conflicts. It is illegal to feed bears. This should be a strictly enforced camp policy (see solid waste guidelines below). Camp policies should also clearly prohibit leaving foods or other bear attractants in the field or work area. These policies need rigorous enforcement.

Road construction and access:
Road construction in brown bear habitat should be minimized. Construction of roads should be avoided less than one mile from important seasonal concentration areas (anadromous salmon streams, berry fields, estuarine sedge flats, etc.). Where road construction in bear habitat is unavoidable, public and recreational access should be prohibited and strictly enforced. When roads are no longer necessary, they should be permanently removed or made impassable to motorized vehicles.

Habitat impacts:
Construction of industrial facilities and recreational or homesite developments should be avoided in areas of seasonal bear concentrations. Short-term intensive human use of seasonal bear concentration sites should be scheduled to avoid peak periods of bear use. Logging of riparian old-growth forest adjacent to anadromous salmon streams should be avoided within 500 feet of the streamside.

Harassment of bears:
Bears should not be harassed or chased by motorized land vehicles or aircraft. Bears should be approached no closer than 500 feet and 1,000 feet by fixed-wing aircraft and helicopters, respectively.

Bear-human conflicts:
ADF&G has developed a policy for dealing with bear-human conflicts. This policy emphasizes the prevention of conflicts through public information, reducing attractants (food, garbage), and nonlethal deterrence. In cases where immediate danger to an individual or his property exists, offending bears may be killed by any individual under provisions of the Defense of Life and Property (DLP) regulation (5 AAC 92.410). This regulation should be employed only as

a last resort. If a bear is killed under DLP provisions, and the taking was brought about by improper garbage or a similar attractive nuisance, the offender will be warned or cited. It is not legal to kill a bear to protect a hunter-killed game animal.

Education:
All industrial camps and other facilities (lodges, fish camps, fish hatcheries, tour groups, research and exploration camps, etc.) should routinely provide bear safety education to their employees. This can be accomplished by inviting wildlife managers from state or federal agencies to periodically speak to camp staff or by using educational material from those agencies. Bear safety programs should emphasize camp sanitation, basic bear biology and behavior, how to avoid contact with bears in the field, and what to do in case of a bear encounter.

FOOD AND SOLID WASTE GUIDELINES

Human activities and industrial camps located in brown bear habitat should comply with the current ADF&G "Policy on Solid Waste Management and Bears in Alaska", including the following guidelines.

1. Solid waste disposal sites for communities and permanent field camps should be located in habitats receiving the least use by bears. Traditional movement routes and seasonal concentration areas (such as salmon spawning streams or productive berry areas) should be avoided.

2. The preferred alternative for disposal of organic products that may attract bears is incineration in a facility that meets Alaska Department of Environmental Conservation (ADEC) standards for combustion residue (less than 5% unburned combustibles). In large urban communities or at regional disposal sites, daily landfill and burying is an acceptable alternative to reduce or eliminate attraction to bears, provided that these facilities are secured by a bear-proof fence. Existing open-pit sites that use surface burning for disposal should be phased out and replaced by a system of daily incineration meeting the above standards or by daily landfill.

3. Large (more than 15 people), permanent (longer than one season) field camps should dispose of organic products by daily incineration in a fuel-fired incinerator that meets the above standards. Or, organic products could be hauled daily to an ADEC-approved regional disposal site. Temporary storage of organic products prior to incineration or backhaul should be in a bear-proof enclosure (building or fence). Ideally these camps should be surrounded by a bear-proof

fence. If entire camps cannot be fenced, then dining halls, kitchens, sleeping areas, and incinerators should be fenced, with no organic wastes allowed to be left in vehicles.

4. Small permanent facilities (e.g., lodges, weather stations) or large nonpermanent camps should daily segregate and store organic wastes and items such as cans and jars that are contaminated with organic waste in a bear-proof container for weekly backhaul to an approved disposal site. Alternatives are (1) organic waste and other combustibles could be incinerated in a locally fabricated incinerator meeting ADEC standards for residue, or (2) garbage grinders with disposal to a sewer system could be used to remove organic wastes, while contaminated combustible and noncombustible wastes could be incinerated or temporarily stored as above.

5. Food and organic wastes, if stored outside in bear habitat, should be stored in sealed bear-proof containers. Although it is not necessary to remove fish or game carcasses from the field, these should not be left at a central site nor should they be left in or near a campsite or other place with high potential for bear-human conflicts.

6. Small parties using Alaska's backcountry should burn all combustibles and pack out all noncombustibles. Organic material should not be discarded along trails. Caution and common sense are required to reduce or eliminate bear attractants.

7. In all new parks, roadside facilities, and temporary construction worksites located in bear habitat, bear-proof garbage cans and regular garbage pickup should be required. This requirement should be phased into all existing facilities as soon as possible.

8. Baiting and feeding bears and other wild game by photographers, tourists, hunters, or others is prohibited except for trapping furbearers or hunting black bears consistent with regulations on black bear baiting.

9. Bears currently accustomed to eating garbage should be handled on a case-by-case basis according to the ADF&G's guidelines for managing bear-human conflicts.

GARBAGE
KILLS BEARS